

JOURNAL
OF THE
BOMBAY
Natural History Society.

Vol. XVIII.

BOMBAY.

No. 1.

A POPULAR TREATISE ON THE COMMON INDIAN
SNAKES.

ILLUSTRATED BY COLOURED PLATES AND DIAGRAMS.

BY MAJOR F. WALL, I.M.S., C.M.Z.S.

Part V. with Plate V.

(Continued from page 870 of Vol. XVII.)

THE RUSSELL'S VIPER (*Vipera russellii*).

Nomenclature.—Scientific.—The generic name is from the latin *vivus* alive, and *pario* I bring forth. It was first used scientifically by Laurenti in his work published in 1768. Daboia, another generic name for a long time in use, and perhaps more familiar to many of an older generation, was introduced by Count De La Cépède in his work published in 1789.* The name "Le Daboie" was applied by him to a West African viper of uncertain identity marked somewhat similarly to Russell's viper, in that it had 3 series of large oval spots. "Daboie" was, I believe, the local vernacular name for this snake. Later, Gray in 1842 applied the same term, only latinised, to Russell's viper, which, it may be remarked, does not occur in Africa.

Specific.—This title commemorates the name and fame of Dr. Patrick Russell, a distinguished savant, and the pioneer of all snake

* P. 255.

research work in India, both in its zoological and toxicological aspects. He was born in Edinburgh in 1726, and came out to India in 1781. Four years later the Honourable the East India Company appointed him their naturalist. He is responsible for a monumental work on the Indian snakes with excellent coloured plates, in two volumes published in 1796 and 1801.

The association of his name with this common snake, renowned as much for the beauty of its colour and ornamentation as for the deadly character of its bite, is a fitting tribute to his classical work.*

English.—The usual name among the Anglo-Indians is Russell's viper, but Daboia is almost as frequently in use. It is also occasionally called the Chain viper.

Vernacular.—It would be a matter of surprise if so well known, and justly dreaded, a creature had not been christened in almost every vernacular. That mysterious creature the "Cobra monil" of the natives, whose identity, if ever appreciated by them, has become obscured by the lapse of time, is probably this snake as suggested by Jerdon.† The name probably originated with the Portuguese, "monil" or "moualla" in their tongue signifying a necklace, and "cobra" or "copra" a snake.

In Ceylon it is universally known as "Tic polonga," which means, I am informed, "spotted snake." In Southern India it is known as "Mandalli" and "Kanardi virian." The former, Nicholson says, implies a ringed or decorated pattern. The latter, which I have heard used chiefly about Madras, is from "Kanardi," glass, and the allusion, I think, is to the spots which suggest to the fanciful native mind the appearance of the small mirrors used by them in their tawdry decorations, and frequently seen attached to cloths used as curtains, etc.

On the Malabar Coast (Cannanore) "Mandali" and "Rutheram mandalli" are in use, the former being also applied to the sand snake (*Eryx conicus*), and the latter used to discriminate between these species. "Rutheram" meaning "bloody" emphasises one of the most obvious effects of its bite, *viz.*, bloody discharges.

* It may be of interest to note here that an elder brother of his, Alexander, has also left his name in this country to be handed down to posterity. The beautiful little garden shrub, *Ruscelia juncea*, with its curious foliage like casuarina and its vermilion flowers, which scarcely any Indian garden is without, is named in his honour.

† Journal, Asiatic Society, Bengal, Vol. XXII, p. 524.

In Mysore a Canarese Dictionary I referred to gives "Mandalatha havu" as the local name. "Havu" means snake. Rice in his work on Mysore* gives the Canarese name for it as "Kolaku Mandala." On the Coromandel Coast about Vizagapatam Russell gives its local name as "Katuka rekula poda," which I am told is Telugu, and refers to blackish spots.

About Bombay and in the Konkan it is known as the "Ghanas." In Guzerat Mosse says it is called "Chitar," and Fenton in the Dantra District "Khad chitra." "Khad," according to the latter, signifies "grass" and "Chitar" or "Chitra" recalls to mind other native names for spotted creatures.†

In Sind I am told it is called "Koraile."

In Bengal it is known as "Bora," "Chandra bora," "Uloo bora," "Jessur," and "Sial chandra amaiter" according to Fayerer. "Bora" probably implies spotted.‡ "Chandra" = moon, and refers as usual to the spots. "Uloo" is the name for "grass." The Burmese call it "Mwé bwé," meaning ringworm snake, its marks suggesting a skin disease.

Dimensions.—The largest specimen I have measured was a stuffed one in Trichinopoly 5 feet 3 inches in length. Lieut.-Colonel Fenton recorded one in this Journal¶ 5 feet 4½ inches long, and Mr. Brook Fox§ two measuring 5 feet 6 inches each. This is the largest record known to me. Specimens exceeding 5 feet are exceptional.

Bodily configuration.—The girth is remarkable. I think this viper is of stouter build than any other Indian snake, and its capability of inflating itself under excitement, premonitory to its violent hiss, accentuates this peculiarity.

The head is flat, and broadens considerably posteriorly so as to make a moderate neck appear unduly small. A pronounced ridge (*canthus rostralis*) runs from the supercilium to the top of the snout. The eye is moderate in size, the iris golden, and the pupil vertical. The nostril

* Vol. I., p. 188.

† Blanford in his Fauna of British India, Mammalia, gives "Chita" and "Chitra" as local native names for the hunting Leopard (*Cynaelurus jubatus*). Again he mentions native synonyms as "Chital" and "Chitra" for the spotted deer (*Cervus axis*). "Chita" is also applied to the Leopard (*elis pardus*).

‡ I notice the spotted deer, according to Blanford, is called in Bengal "Boro khotiya".

¶ Vol. XVI, page 173.

§ Vol. VIII, page 565.

is remarkably large and open, larger than in any other Indian snake. The tail is relatively short, and unusually apparent, owing to the rapid decrease in girth which occurs about the region of the vent.

The whole snake is remarkably rough, owing to the pronounced ridges (keels) on its scales.

Colour.—The ground colour is brown of varying shades, most specimens being a sandy, or cocoatina tint. The markings vary much in detail and intensity as well as in hue. Sometimes they are so obscure as to attract little attention, and this is especially so just before desquamation. The sloughing process over however, the same snake may reveal a definition of adornment, and brilliancy of colour, which may renovate it as completely as a mess uniform transforms an officer when exchanged for his khaki. The head has a more or less distinct dark patch on each side behind, a dark streak sometimes picked out with white, pink, or buff, behind the eye, and a dark stripe from the eye to the lip. A conspicuous light line, sometimes white, buff, or pink, runs from above the gape, through the temporal region to the supercilium on to the ridge just referred to on the snout. These lines converge, and sometimes meet on the snout to form a V. The lips are white, whitish, or pink variegated with spots, specks, or streaks.

The dorsal adornment consists of a triple series of large ovate spots, forming a vertebral, and two costal necklaces or chains, hence the term "Chain viper." Davy remarks*: "In some specimens the marks are oval, and in some more pointed, and rather trapezoidal; in others surrounded by a white margin; in a fourth lightest in the middle." It is not infrequent to see some of these spots more or less confluent, in fact, it is rarely one sees a perfect rosary. The costal spots are frequently interrupted at their lower margins, and sometimes taper, reminding one of a balloon.†

Each spot may be of uniform colour throughout, but more often exhibits a light central zone, similar to the ground colour, which merges into a deep Lincoln-green, purple, or black, around which again may be seen a narrow zone of buff or pure white, the latter

* "An Account of the Interior of Ceylon," p. 85.

† Since writing this I have seen a specimen sent to this Society by Mr. Kinloch from Kotagiri (5,700 ft.) in the Nilghuris in which the three series of spots are completely confluent into bands. The sinuous outlines of these bands indicate the number of spots, which however are broadly blended, in the entire length of the snake. It is the only one I have seen so marked.

especially enhancing the beauty of the specimen, as may be judged from our plate. Mr. Millard tells me that about Bombay adult specimens do not have this white definition to the spots, and he is inclined to regard it as a distinct variety. I have satisfied myself that specimens are to be met with in most parts, including Bombay, with and without this white adornment. To begin with, I found in some hatchlings of the same brood born in this Society's Museum, and preserved in spirit, some individuals with and some without the white delineament. Davy, already quoted, remarks that white margins, to the spots may or may not be evident in Ceylon specimens. In a mother I referred to in a note in this Journal* from Saugor, the spots had no light margins, though the single embryo had spots picked out with pale buff. Again, a specimen figured by Russell† obtained from Bombay has no suspicion of a light outline to the spots.

The belly is white, whitish, or yellowish, with darkish semilunes distributed sparsely, and disposed at the margins of the ventrals, especially in the fore body.

Identification.—Consideration must be given to the following points, all of which must coexist:—

- (1) Head covered above with small scales throughout, similar to those on the back.
- (2) No aperture between the eye and the nostril.
- (3) Subcaudals divided.
- (4) No ridges on the ventrals.
- (5) 3 series of large dorsal spots.

It may seem unnecessary to many to insist on this method of identification. Many I know who consider themselves knowledgeable on snake matters, would take it as a reproach to their intelligence to suppose they cannot rely on colour and marks alone; however I have known mistakes occur, and very positive opinions expressed erroneously with regard to this species. More than one officer in China was very positive that they had captured Russell's viper in their camp at Shanghai, publishing letters with some heat in the local paper when their opinions were repudiated. The specimen which I subsequently examined proved to be the common Chinese Viper (*Ancistrodon blomhoffii*). I have seen a young python (*molurus*) identified as a daboia, and failed to convince

* Vol. XVI, p. 374.

† In J. Serp., Vol. II, plate XXXII.

another positive gentleman of his mistake. The sandsnake *Eryx conicus* I have several times known taken for this viper, and, incredible as it may seem, the Burmese tree snake *Dipsadomorphus multi-maculatus*. This latter is a very slender little snake which has two series of ocelli, or ovate spots costally, these latter misleading its captor. Many specimens of *Zamenis diadema* are marked somewhat like the Daboia.

Habits, haunts.—It may be met with almost anywhere except, I believe, in dense jungle, but it prefers open country into which the sun can penetrate and shed its agreeable warmth. Here it lies by day amongst the vegetation, in lazy apathy, apparently oblivious to its surroundings, but never, however, relaxing a vigil, which has for its reward the capture of the incautious animal that chances to stray within reach. In the evening it bestirs itself, and roams abroad whilst darkness prevails.

Its movements are slow, and consistent with its corpulent habit. When disturbed it prefers usually to maintain its ground, and frequently will contest the right of way with heaving sides, and angry hiss. When it does retire, it does so in a leisurely manner befitting its dignity and figure.

Fayrer* remarks on the authority of his snakeman that it will take to water, and Haly† mentions one swimming in the middle of a back-water. These are exceptional instances. Tennent‡ says that it will climb trees, and I can confirm this as a rare event, having known one in a low hedge. Its ungainly proportions, however, do not favour scansorial achievements. It is no uncommon event to find it in close proximity to and even in habitations, and its partiality to a murine diet sufficiently explains such intrusions. I remember one captured in Rangoon beneath the steps of the Cantonment Magistrate's Court during the day, with crowds of natives all about. Bassett-Smith§ mentions it as frequently coming into the precincts, and into the Naval Hospital at Trincomalee, and Tennent¶ says the Judge's house at this same station became so infested with this species, that the family had to quit.

Disposition.—No observer can speak with greater authority than

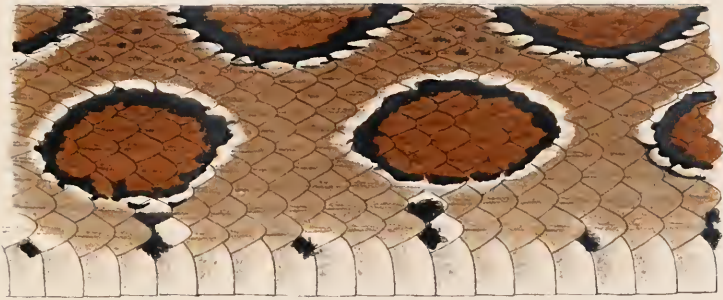
* Loc. cit., p. 15.

† First report on the collection of snakes in the Colombo Museum, 1886, p. 18.

‡ Loc. cit., p. 306.

§ Jour., Bom. Nat. Hist. Soc., Vol. XI, p. 546.

¶ Loc. cit., p. 296.



P. Girhardt del.

J. Green Chromo lith.

THE DABOIA, CHAIN-VIPER, TICPOLONGA,
OR RUSSELL'S VIPER.
Vipera russellii. (poisonous).

Fayrer, and he says of the Daboia: "In confinement it is sluggish, and does not readily strike unless roused, and irritated, when it bites with great force, and determination. When disturbed it hisses fiercely, and when it strikes does so with much vigour." This is entirely my own experience. It is a creature slow to wrath, contenting itself under moderate provocation, with a loud sustained and warning hiss, reminding one of a leaking foot-ball bladder. It will not strike till considerably irritated, when it hurls itself at the offending object with determined malice. I have known one spring with such a powerful muscular effort that I believe it actually left the ground in its endeavour to strike me.

The hiss once heard is not easily forgotten; no other snake emits such a volume of sound, to the production of which two factors contribute. Firstly the size of the lung which is developed to a degree commensurate with the remarkable body girth, and secondly the large size of the nostril, for it is through this aperture that the sound is produced.

In Bangalore I experimented with a large adult belonging to a snakecatcher. Among his stock in trade he carried the familiar gourd pipe used by this fraternity. This was sealed up in places with cobbler's wax which I removed, rendered pliable by heat, and packed into the Daboia's nostrils. This done the snake was unhandled, and irritated. It was then noticed that the lung expanded with difficulty, and very imperfectly, and hissing was no long feasible.

A good example of its disinclination to bite is related by Blanford*; a friend of his once carrying one home under the belief that it was a python until undeceived by its biting, and killing one of his dogs. It made no attempt to bite or injure him, though apparently he did not take any precautions in his manner of handling it. Again Fayrer† says he always during his experiments had the greatest difficulty to get this snake to bite voluntarily. I can fully confirm this; frequently rats put in as food into its cage remain there alive and unmolested for days. In making these remarks, however, I think one must expect many exceptions to this attitude of indifference. Young specimens especially seem more on the alert, more easily alarmed, and are correspondingly more easily provoked to bite than many adults.

The bite is sometimes inflicted by a snap, the creature relaxing its hold

* Journl., Asiat. Soc., Bengal, Vol. XXXIX, p. 374.

† Thanatoph. Ind., p. 64.

at once. On the other hand it is not unusual for Russell's viper to bite, and maintain a tenacious grasp for many seconds. In the case of a gunner who succumbed to the bite of this snake at Thayetmyo (Burma) in 1862, Nicholson* mentions that it was with difficulty shaken off. Elliot† mentions a dog bitten by one, dragging the snake many yards before disengaging it, and one might quote many more similar experiences.

Poison apparatus.—The fangs.—These attain their maximum development in this the largest of the Indian vipers. There may be a single one in each maxilla, or two fixed side by side. In a depression at its base, and on the outer side, as many as 5 or 6 reserve fangs may be seen lying loosely in the mucous membrane, progressively diminishing in size from within outwards. When one of the fixed fangs is shed, the reserve fang best developed, and lying nearest to it, becomes cemented in a few days into the jaw.

The fang is tubular, being formed by the folding over of two lateral expansions of the tooth, which blend on its anterior face, in the major part of its length. A groove which is feebly discernible, but always present, marks the line of junction of these two expansions. At its base the expansions fail to meet, and the imperfect blending is marked by an aperture. The canal terminates near the point of the tooth in a minute opening.

The fangs in vipers are very mobile or to speak more correctly, the

maxillæ are, for the fangs are fixed into these bones. Russell's viper, like other vipers, when it yawns, frequently rocks its maxillæ forwards and backwards.



- A. Inner aspect of fang (life size) the lower orifice of the canal is inclined slightly inwards.
 B. Anterior aspect (life size) showing seam where the two edges have been welded.
 C. Tip (enlarged) showing lower orifice and point, closely resembling tip of hypodermic needle.

Glands.—These sacs compared with the cobra's are small, and present a corrugated appearance unlike the smooth retort-shaped glands of the cobra. Elliot‡ obtained 11 drops from the 2 glands of an adult. Wall¶

* Ind. Snakes, p. 146.

† Trans. Brit. Med. Association, S. Ind. br. 189, p. 7.

‡ Loc. cit., p. 33.

¶ Indian Snake Poisons, p. 113.

(A. J.) mentions a supplementary gland in this viper, globular in form, which completely surrounds, and empties itself into the ducts draining the major sac.

Poison.—*Physical qualities.*—Lamb* tells us that this venom is clear, with a small quantity of undissolved material in suspension. Its reaction is acid. The taste resembles gum acacia. In drying it cracks into longitudinal fissures yielding needle-shaped fragments. The dried product retains its toxic properties indefinitely, and is readily soluble in water.

Effects internally.—When swallowed, daboia venom has no more deleterious effect on the system than cobra poison, but of course one must postulate a healthy and unbroken surface in the mouth, and further passages. Elliot† gave 11 drops to a goat, and a larger quantity to a dog without noticing any ill effects.

Toxicity.—As every one in this country is doubtless fully aware, Russell's viper ranks among our deadliest snakes. The action of its poison is so different from that of cobra venom, that one can hardly compare their relative degrees of virulence. The poison appears to be as fatal in the doses usually injected during a bite, but death, except experimentally, is not so rapidly produced in large animals including man. Russell saw a fowl die in 36 seconds, Fayrer a fowl in 34 seconds, and Millard a rat die in 35 seconds. Lamb, however, has shown that these cases of precipitate death are attributable to relatively very large doses, and that in the case of large animals the dose necessary to produce such rapid death is larger than a Russell's viper could inject at one bite. A dog mentioned by Davy died 58 minutes after a bite in the leg. The dog Elliot saw succumb to a bite, died in less than 3 hours. Another dog which Traill saw bitten in four places died in 8 hours. The gunner referred to by Nicholson succumbed in 27 hours. In a case cited by Fayrer, an adult man died in 7 hours.

As in the case of other poisonous snakes it does not, however, in the least follow, that a serious bite will cause death if left untreated. There is abundant evidence to show that a percentage of cases, hard to determine, do not die even though the local injuries are such as to warrant the gravest apprehension. No more instructive record on

* Jour., Bom. Nat. Hist. Soc., Vol. XIV., p. 222.

† Loc. cit., p. 33.

this score is to be found in snake literature than that quoted by Elliot*. He says: "I myself saw a large powerful daboia (3 feet 8 in. long) "strike fairly at a dog, hold it, shake it, and only let go when the dog "had fled yelping several yards, dragging the snake along the ground. "The part bitten was soft, and fleshy, the bite was apparently a fair "one, the glands of the snake when dissected, though emptier than "usual, both proved to contain poison. From one gland alone I "obtained more poison than another daboia emitted through a "leaf in a vigorous bite. Add to all this that there was a well marked "subcutaneous extravasation round the bite, and the case seems perfect, ". . . . though it became rather ill, did not die." "Eight "days later the same animal was fairly struck by a vicious daboia "(3 feet 4 in. long), the bite being almost instantaneous in its short- "ness, and this time the victim died in less than three hours."

Haly† mentions a bite from this snake, from which the man suffered no ill effects.

In a recent number of this Journal‡ Colonel Bannerman expresses the belief that the young daboia is not provided with poison in its earliest days, or at any rate that the poison if secreted is too weak to kill even small creatures. This does not accord with my own observations, which convince me that they enter the world with a sufficiently abundant and active poison to thoroughly equip them in their struggle for existence. In confirmation of my own opinion I find that Dr. Shortt§ had a gravid daboia in captivity. On the production of its brood, a young one, measuring only $8\frac{1}{2}$ inches when 6 hours old, killed a young partridge weighing $9\frac{1}{2}$ tolas in 10 seconds! The failure of Colonel Bannerman's experiments must be attributed to the uncertainty of the effects of the bite already alluded to.

Further comments upon the poison of this snake are beyond the scope of this paper.

Food.—All my observations go to show that small mammals, and especially rats, constitute the main diet of the daboia. but it is not so bigoted in gastronomic matters as to be disdainful of other fare. Mr. E. E. Green found one that had eaten a green lizard (*Calotes*

* Loc. cit., pp. 7 and 36.

† First report on the Collection of Snakes in the Colombo Museum, 1886, p. 18.

‡ Vol. XVII., p. 811.

§ Cyclopædia of India, Vol. V., p. 433.

ophiomachus) as well as a rat. Major Evans knew one in captivity eat two frogs, and a specimen in captivity in the Madras Museum* ate during its incarceration 5 squirrels besides 27 rats, whilst the young ate 67 mice, 5 squirrels, 4 frogs and 2 small rats.

In captivity as a rule they refuse food,† and it is surprising how they can keep health and vigour after months of deprivation from food and drink. Davy‡ had a specimen he kept for 146 days without food, and then allowed to bite a fowl which succumbed in a few seconds. Fayrer§ had one which lived for a whole year without food or water, and it was “vigorous and venomous to the last.” I know of no snake-eating tendencies in adults, but cannibalism seems a common offence among the young. Major Dawson writes to me that on one occasion when young daboias were born in the gardens at Trevandrum, “the young commenced to devour each other,” and on another occasion in the same place “one of the young swallowed one of its fellows, and in about a quarter of an hour disgorged it,” and both at the time of writing were alive, and well. Father Dreckmann, too, told me of a similar experience among a brood born in captivity; he says “when I inspected the young family one morning, I found one of its members dead, and another one missing, and on examining the dead one I found the missing one inside him.”

Breeding.—The literature on this snake affords more records of breeding than any other snake, I might almost say than all other Indian snakes taken together.

In spite of Colonel Bannerman’s opinions expressed in a recent article in this Journal, and already referred to by me here, I think there can be no question that the daboia is viviparous in habit.

I am of opinion that the word “egg” as applied to the offspring and their envelope by this observer is misleading. The term “egg” is, it is true, a very indefinite one, which strictly speaking might be applied even to the human infant born in a caul. Its use, however, is restricted, at any rate in the popular mind, to the female cell impregnated or otherwise contained within a maternal envelope of chitinous,

* Administration Report of Madras Govt. Mus., 1896-7.

† Mr. Spence, however, informs me that in his 7 years’ experience in the Bombay Society’s rooms this snake has fed better than any other species.

‡ Loc. cit., p. 85.

§ Loc. cit., p. 15.

coriaceous, or cretaceous material. At a certain stage of embryonic development in viviparous snakes, eggs in the sense just referred to are to be found within the mother, invested with a leathery covering similar to that which is characteristic of the eggs in oviparous snakes. In viviparous snakes, however, the egg undergoes a metamorphosis never seen in the eggs of an ovipara. At a certain stage the leathery investment disappears, and the embryo as it approaches full term is found to be suspended in a limpid oily fluid, contained within a delicate, transparent sac, which I take to be the amnion, a fetal not a maternal structure. At this stage it appears to me to be exactly comparable to the condition of a human infant born in caul.

Even supposing that a snake discharges fertile ova, it by no means follows that it is to be considered oviparous. Emotional and other causes are known to operate upon many gravid animals so as to cause in some cases the premature discharge of the fruits of generation, and it is no unreasonable assumption to suppose that similar causes may operate in the same direction in snakes. That they are susceptible to nervous influences is certain, or how otherwise can one explain the disagreeable habit so frequently evinced by captured snakes even when quite unscathed, of disgorging the contents of their stomachs, even when the rejectamenta are so far digested as to be unrecognisable.

Period of gestation.—From one of Colonel Bannerman's interesting domestic occurrences at Parel, it appears that the period from conception to discharge of the young exceeds six months.

Breeding season.—From this last statement it appears that these vipers are mating in the cold months. This receives confirmation by a note of mine dated Cannanore 28th December 1903: a male specimen was brought me said to have been in copula; the female escaped capture. In cold climates this implies that they mate during the season of hibernation. This, if true, appears most remarkable for at this season a snake's vitalities are at their lowest ebb and not one would think favorable to the consummation of so important a function.

Fecundity.—It is a prolific snake producing sometimes more than 60 young at a time. Some mothers, however, are more modest in their estimate of matrimonial duty, contenting themselves with a family of less than 20. One recorded by me in this Journal contained but one

solitary fetus. I am inclined to think from observations on other snakes that the oldest mothers are the most fecund.

On two occasions at Trevandrum Major Dawson tells me that the mother died on the 3rd day after parturition, but this must be considered a coincidence. It is certain that the mother usually survives the advent of her brood, and one may presume lives to produce others.

Genital organs.—The ovaries are long, and the follicles loosely strung together. In one mother 4 feet 9 inches in length the ovaries were $6\frac{1}{2}$ inches long.

The male genitals are peculiar. The clasper on each side is bifid, a character I believe to be found in all vipers. I have also observed the same condition in the sea-snakes, but not in any other colubrines. In a male 3 feet 7 inches in length, the main stem of each clasper was about half an inch long.

Hatchlings.—The young at birth vary from about $8\frac{1}{2}$ to 11 inches. I very much suspect that the living embryos referred to by Stoliczka as 3 or 4 inches long* were not actually measured by him but their length guessed at.

The young usually rupture the sacs in which they are developed, before birth, that is, whilst still within the maternal abdomen. They then enter the world perfectly free. It is not unusual, however, for some or all of a brood to be born in cauls which they subsequently rupture. In a case alluded to by Mr. Phipson the hatchlings did not effect their escape till the day after deposition, a circumstance extremely remarkable, and to me inexplicable. Drowning would appear the inevitable consequence of any delay in such cases. According to Colonel Bannerman under these conditions the sac is split into 2 halves like a mussel shell. The young frequently cast their skins shortly after birth, often within a few hours. After birth they congregate, and lie together in a confused heap in captivity, but in nature very soon disperse. Their food is probably the same as adults. A young one I caught in Cannanore on a pot plant in a verandah, $10\frac{1}{4}$ inches in length, had just swallowed a mouse.

I have collected 21 breeding notes from various sources which I append in tabular form.

* See accompanying schedule of breeding events.

Date.	Locality.	Number.	Authority.	Remarks.	Reference.
April 1896	Trichinopoly	36	Self	Eggs in abdomina with no trace of embryo.	My notes.
May 1896	Do.	24	Do.	Do.	Do.
March 1902	Guzerat	55	Mosse	Do.	Bom. Journ., Vol. XV., p. 134.
June 1903	Bombay	9	Bannerman	4 born alive in membrane; young about 9 inches long. 5 non-fertile eggs.	" " XVII, p. 808.
July 1906	Wardha	15	Do.	7 born alive in membrane; fertility of rest not recorded.	" " " "
September 1875	.....	...	Miss Hopley	Young born in Regent's Park, London. Some free, some in membrane.	" Snakes", p. 436.
June 1903	.....	14	Millard	3 young born alive and free; the rest dead hampered by membrane.	In Epistola.
June 1904	Howrah	25	Bannerman	Young deposited. Some ruptured membranes found on floor of cage.	Loc. cit.
July 1872	.....	39	Shortt	Young born 8½ inches long; no further details.	Cyclopadia of India, Vol. V, p. 433.
.....	.....	40	Richards	Young born; no details...	Landmarks of Snake Poison Literature, p. 21.

Date.	Locality.	Number.	Authority.	Remarks.	Reference.
.....	.....	9	Dreckmann	Young born; no details...	In Epistola.
July 1904	Barma	62	Evans	Do.	Do.
May 1899	Trevandrum	18	Dawson	Do.	Do.
May 1905	Do.	21	Do.	Do.	Do.
June 1902	.....	33	Millard	Young born; 3 dead; 10½ to 11 inches long.	Bom. Journl., Vol. XIV, p. 614.
June 1899	Indore	63	Cholmondeley	Young born, no details; length 9 to 10 inches.	" " " XII, p. 765.
November 1904	Saugor	1	Self	Young in membranous sac in abdomina.	" " " XVI, p. 374.
.....	.....	40	Anderson	Young in abdomina	Fayrer, Thanatophidia of India, p. 14.
.....	Umritsar	18	Stoliczka	Young 3 to 4 inches long; alive in membranous sacs in abdomina.	Fayrer, Loc. cit., p. 55.
July 1893	.....	40	Traill	Young in abdomina, fully developed	Bom. Journl., Vol. VIII, p. 316.
.....	.....	...	Phipson	In Society's Museum; in one case the embryos did not escape from membranes till the day after deposition.	" " " VI, p. 420.

Distribution.—Throughout the whole Indian Empire from Ceylon in the South to the Himalayas in the North. In the West it extends into Sind, and in the East to the furthest borders of Burma. Its distribution within these limits is, however, capricious. Irrespective of moderate altitudes it is extremely common in certain parts whilst it is extremely rare or absent in others.

In some parts of the Punjab it is very abundant. Fayrer tells us that at Umritsar in 1866 as many as 471 specimens were brought in for rewards in a single day.

Mr. Millard tells me it is very common about Bombay. I found it so on the same coast at Cannanore, and Ferguson still further south at Travancore. Haly and Ferguson say the same as regards Ceylon, and Tennent and Bassett-Smith especially mention Trincomalee in that Island. I found it abundant about Trichinopoly, and in the Central Provinces. Judging from the plethora of local names for it in Bengal mentioned by Fayrer, Ewart, Richards, and others it is probably common in parts of that Province. I am inclined to think, however, it is chiefly so in the Eastern parts of Bengal.

In Burma, Theobald remarks on its abundance in the Tharrawaddy district, and about Rangoon, and I can fully confirm this statement. In some parts of Upper Burma, notably Mahlaing, Magwe, and Myo-thit, it is so abundant in the crops that the natives make themselves special grass shoes as a protection.

It is by no means confined to the plains, occurring plentifully in many upland regions, and has been met with up to 7,000 feet. From Ceylon I obtained specimens from Hakgalla (5,700 feet). Ferguson says it is not uncommon in the hills of Travancore. Mr. Henderson tells me he met with it in the Nilgiris at 6,000 feet, and that it was fairly common in the Palneys at 7,000 feet. Father Gombert writes to me that it is common at certain seasons in the Palneys up to 6,300 feet. Stoliczka records it from Kashmir up to 6,000 feet.

On the other hand Nicholson says it is rare in Mysore, Richards in Bengal, referring, I think, to the Western Parts. In two years in the United Provinces (Fyzabad) out of many hundreds of specimens of snakes I never saw one *daboia*. Colonel Pratt and Mr. Oakes, both for many years familiar with these Provinces, had never seen or heard of it except at Sitapur. About Delhi I never saw or heard of one, though I have good authority for stating that it is very common about